

CLAIMS

1. Method for producing hot-rolled strip (10) with a dual-phase microstructure consisting of ferrite and martensite, wherein at least 70% of the austenite is transformed to ferrite from the hot-rolled state by a controlled two-stage cooling operation after the finish rolling to a strip temperature below the martensite start temperature in a cooling line (1, 1') that consists of successive, spaced water cooling units (3₁₋₇, 4), characterized by the fact that, to obtain a hot-rolled strip (10) with a dual-phase microstructure consisting of 70-95% ferrite and 30-5% martensite with high mechanical strength and high formability (tensile strength greater than 600 MPa, elongation after fracture at least 25%) in the cooling line of a continuous casting and rolling installation, starting from a steel with the following chemical composition: 0.01-0.08% C, 0.9% Si, 0.5-1.6% Mn, 1.2% Al, 0.3-1.2% Cr, remainder Fe and customary trace elements:

(a) the two-stage controlled cooling is carried out from a finish rolling strip temperature T_{finish} , such that $A_3 = 100 \text{ K} < T_{\text{finish}} < A_3 = 50 \text{ K}$, to a coiling strip temperature $T_{\text{coiling}} < 300^\circ\text{C}$ (< martensite start temperature), wherein the cooling rate $V_{1,2}$ in both cooling stages is $V = 30\text{-}150 \text{ K/s}$, and preferably $V = 50\text{-}$

90 K/s, and

(b) the first cooling stage is carried out until the cooling curve enters the ferrite range, and then the heat of transformation liberated by the transformation of the austenite to ferrite is used for isothermally holding the strip temperature thereby reached $T_{\text{const.}}$ for a holding time of 5 s until the beginning of the second cooling stage.

2. Continuous casting and rolling installation for producing hot-rolled strip (10) with a dual-phase microstructure from the hot-rolled state, with a cooling line (1, 1'), which is installed after the last finishing stand (2) and has several successive, spaced water cooling units (3_{1-7} , 4), for carrying out the method in accordance with Claim 1, characterized by the fact that the cooling line (1, 1') has a standard length (< 50 m) for conventional continuous casting and rolling installations, within which a suitable number of automatically controllable water cooling units (3_{1-7} , 4) are arranged in such a way that the required cooling rate ($V_{1,2}$) of each cooling stage can be adjusted and the required holding time at the strip temperature $T_{\text{const.}}$ between the two cooling stages can be realized by an adapted mode of operation of the entire cooling line as a function of the strip thickness and the strip speed.

3. Continuous casting and rolling installation in accordance with Claim 2, characterized by the fact that each water cooling unit (3₁₋₇, 4) contains several spray bars that can be automatically controlled by switchable valves (7), that the spray bars are arranged in such a way that the upper surface (10') and the lower surface (10'') of the hot-rolled strip (10) passing through the cooling line are uniformly sprayed with a certain amount of water, and that the amounts of water for the upper surface (10') and the lower surface (10'') of the strip can be trimmed even relative to each other.

4. Continuous casting and rolling installation in accordance with Claim 3, characterized by the fact that the last water cooling unit (4) for cooling the upper surface (10') and the lower surface (10'') of the strip has eight switchable valves (7) for each four spray bars on the top and on the bottom to allow more exact adjustment of the amount of water.